GA1.13:RCED-89-2

United States General Accounting Office

GAO

Report to the Chairman, Subcommittee on Energy and Power, Committee on Energy and Commerce, House of Representatives

33

February 1989

# NUCLEAR WASTE

# DOE's Method for Assigning Defense Waste Disposal Costs Complies With NWPA

GAO/RCED-89-2

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**Resources, Community, and**
**Economic Development Division**

B-202377

February 2, 1989

The Honorable Philip R. Sharp
Chairman, Subcommittee on Energy
and Power
Committee on Energy and Commerce
House of Representatives

Dear Mr. Chairman:

As requested, we have been reviewing the Department of Energy's (DOE) (1) method of allocating costs to the federal government for disposal of nuclear waste from defense activities and (2) plans for making defense waste disposal payments into the Nuclear Waste Fund. However, DOE has not finalized key documents needed for our review of the latter issue. Therefore, this report addresses DOE's cost allocation methodology and, as agreed with the Subcommittee staff, we will address DOE's payment plans in a forthcoming report.

Unless you publicly announce its contents earlier, we plan no further distribution of this report until 30 days from the date of this letter. At that time, we will send copies to appropriate congressional committees, the Secretary of Energy, and other interested parties. We will also make copies available to others upon request.

Major contributors to this report are listed in appendix IV.

Sincerely yours,

Keith O. Fultz

Keith O. Fultz
Senior Associate Director

# Executive Summary

## Purpose

In April 1985, the President decided that the Department of Energy (DOE) should dispose of its highly radioactive waste from national defense activities in the same repositories as commercial nuclear waste because of cost savings. DOE is required to pay its fair share—almost $6 billion—of the estimated $30 billion in total waste disposal costs.

At the request of the Chairman, Subcommittee on Energy and Power, House Committee on Energy and Commerce, GAO analyzed DOE's method for allocating disposal costs between the generators of commercial and defense nuclear wastes to determine whether the method meets the requirements of the Nuclear Waste Policy Act of 1982. GAO has also included the views of utilities, state regulatory commissions, and their associations on DOE's cost allocation method.

## Background

The Nuclear Waste Policy Act of 1982 established a program within DOE for disposing of commercial nuclear waste in one or more deep underground repositories. The act required development of one repository and selection of a site for a second repository. The act was amended in December 1987 to, among other things, restrict repository-related activities to a single site at Yucca Mountain, Nevada, and require the Secretary of Energy to report on the need for a second repository in about 20 years.

The act requires DOE to allocate the costs of developing, constructing, and operating the repository or repositories between the generators of commercial and defense waste. Further, the act requires that when federally owned or generated defense waste is placed in a repository, the federal government's share of the costs must be "equivalent to" the fees paid by commercial utilities. In effect, neither commercial nor government generators of waste are to pay the costs of disposing of wastes generated by the other sector.

In August 1987, DOE established a three-part method for allocating disposal costs. This method is based on the concept of full cost recovery; that is, all waste program costs are to be paid by those who directly benefit from the program. Costs are classified as either assignable (direct and common variable) costs or common unassigned costs. DOE's method allocates direct costs, such as those for either commercial or defense waste transportation, to the respective waste generator. Common variable costs differ on the basis of repository area used or number of waste packages handled and are allocated on those bases. Finally, common unassigned costs are allocated on the basis of the ratio of direct

and common variable costs assigned to each category of waste generator.

## Results in Brief

DOE's cost allocation method complies with the act's requirements for full cost recovery and equivalency. Assignable costs are directly allocated to the waste generators benefitting from the disposal of their wastes. Further, DOE's method for allocating common unassigned costs is consistent with the accepted accounting concept of allocating costs to parties that either caused them to be incurred or benefitted from them.

Utilities and state regulatory commissions agreed with DOE's method for allocating assignable costs but disagreed with its treatment of common unassigned costs. They stated that because commingling the wastes will avoid the need for a defense-waste-only repository, unassignable costs should be allocated to the commercial and defense waste sectors to reflect the cost avoided for a specific defense waste repository. Under their suggested approach, two-thirds of the common unassigned costs for two repositories would be allocated to the commercial waste sector and one-third to the defense waste sector. In DOE's view, this arbitrary allocation of hypothetical costs for a separate defense waste repository rather than allocating costs on the basis of actual waste program cost information is not an appropriate method to use.

## GAO's Analysis

### Allocation Method Complies With Act

DOE's method of allocating repository costs between commercial and defense waste generators complies with the act's requirements of full cost recovery and equivalency. The method is designed to ensure that DOE will bear the defense waste share of repository costs and that neither commercial waste generators nor DOE will subsidize the other over the life of the waste program.

GAO used the concept of causal, or beneficial, relationship—an accounting concept contained in GAO guidance to federal agencies—to evaluate DOE's cost allocation method. GAO found that the method is consistent with this accounting concept. That is, assignable costs are directly allocated on the basis of cost-sharing factors, such as repository area, to utilities and DOE for disposal of their respective wastes. Also, common unassigned costs are allocated to utilities and DOE in proportion to their

respective shares of the assignable costs. In the absence of specific cost accounting standards that directly apply to these types of costs, DOE has used a rational basis for allocating the costs. (See chap. 2.)

## Disagreement With DOE's Cost Allocation Method

Utilities, state regulatory commissions, and their associations disagreed with DOE's approach for allocating common unassigned costs. They argued that placing both defense and commercial waste in two rather than three (two commercial and one defense) repositories would avoid the cost of a third repository and, therefore, reduce total unassigned costs by one-third. On this basis, they have maintained, DOE should allocate two-thirds of the common unassigned costs to utilities and one-third to DOE. This percentage allocation is based on the assumption that two commercial repositories will be developed. The Nuclear Waste Policy Amendments Act, however, has made the development of a second commercial repository more uncertain.

According to DOE, the utility and regulatory commission cost allocation approach has the advantages of being relatively simple in concept and of avoiding the need to assign and share costs for each cost element in a combined repository program. It is, however, based on cost estimates for separate repository systems for commercial waste and defense waste that will remain hypothetical because separate systems will not be constructed. DOE states that assigning such costs on the basis of the number of avoided repositories ignores information that more accurately reflects the relative levels of activity supported by the facilities and activities that are paid for with common fixed costs.

## Recommendations

GAO concluded that DOE's method for allocating waste program costs to utilities and DOE complies with Nuclear Waste Policy Act requirements and GAO guidance to executive agencies. Therefore, GAO is not making any recommendations.

## Agency Comments

GAO discussed the report's findings and conclusions with DOE officials, and their comments have been incorporated into the report where appropriate. However, as requested, GAO did not obtain DOE's official comments on this report.

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## Abbreviations

| | |
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| DOE | Department of Energy |
| EEI | Edison Electric Institute |
| GAO | General Accounting Office |
| MRS | monitored retrievable storage |
| NARUC | National Association of Regulatory Utility Commissioners |
| NWPA | Nuclear Waste Policy Act |
| OCRWM | Office of Civilian Radioactive Waste Management |
| P.L. | Public Law |
| TSLCC | total system life-cycle cost |

Chapter 1

# Introduction

The safe disposal of spent nuclear fuel and other high-level radioactive wastes has been a national concern for almost 3 decades.[1] On January 7, 1983, the President signed into law the Nuclear Waste Policy Act of 1982 (NWPA) (P.L. 97-425) establishing a comprehensive national program primarily directed toward the safe, permanent disposal of commercial nuclear wastes. On December 22, 1987, the President signed into law the Nuclear Waste Policy Amendments Act of 1987, as part of the Budget Reconciliation Act for Fiscal Year 1988 (P.L. 100-203), which redirects the national program toward siting, constructing, and operating one geologic repository and a monitored retrievable storage (MRS) facility.[2]

NWPA requires that the cost of providing disposal and/or storage services be fully recovered from the generators and owners of nuclear waste through fees paid into the Nuclear Waste Fund established by the act to finance the program. The act also required the President to evaluate by January 7, 1985, whether high-level radioactive wastes generated from atomic energy defense activities (hereafter referred to as "defense waste") should be disposed of in the same geologic repositories as commercial nuclear waste. On the basis of an affirmative decision, NWPA requires the Secretary of Energy to proceed promptly with arrangements for use of one or more of the commercial repositories for defense waste disposal. Such arrangements are to include the allocation of costs of developing, constructing, and operating repositories and paying the government's share into the Nuclear Waste Fund. The 1987 amendments did not change this section of the act.

## President Decides to Commingle Commercial and Defense Waste

In deciding whether defense waste should be disposed of in the same repository as commercial waste, NWPA required the President to consider such factors as cost, efficiency, health and safety, regulation, transportation, public acceptability, and national security. To assist the President in this decision, in February 1985, the Secretary of Energy provided a report to the President recommending that defense waste be commingled with commercial waste.[3] The Secretary estimated that

[1]Spent nuclear fuel is used uranium fuel that has been removed from a nuclear reactor and can no longer be useful in the production of electricity.

[2]An MRS facility is a ground-level or slightly below-ground-level facility that will (1) permit continuous storage, monitoring, management, and maintenance of nuclear waste and (2) provide for the ready retrieval of the waste for either further processing or permanent disposal.

[3]An Evaluation of Commercial Repository Capacity for the Disposal of Defense High-Level Waste (DOE/DP/0020/1, June 1985).

building separate repositories could cost an additional $1.5 billion (in 1984 dollars) in construction, operating, and decommissioning costs. The Secretary's report stated that defense waste could be expected to require about 10 percent of the repository's underground area if defense and commercial waste were combined in the same repository. It further stated that no other factors (efficiency, health and safety, transportation, etc.) would result in a significant advantage by either commingling both wastes or building separate repositories for each type of waste. On April 30, 1985, the President advised the Secretary of Energy that DOE should dispose of defense waste and commercial spent nuclear fuel in the same repository to save funds.

## DOE Allocates Program Costs to Defense Waste

On December 2, 1986, DOE published a Notice of Inquiry and Request for Public Comment in the Federal Register, inviting public comment on a preferred method and two alternative methods for allocating costs associated with the disposal of defense waste. DOE allowed 60 days for public comment, and received written comments from, among others, individual electric utilities, states, associations representing the utility industry, and state regulatory commissions.

On August 20, 1987, DOE issued a notice in the Federal Register describing its final cost allocation method: full cost recovery based on facility usage and activities performed. Under this option, total costs of developing the disposal system would be shared proportionately between the commercial and defense (DOE) sectors, with common costs shared on the basis of (1) areal dispersion (space required), (2) piece count (number of waste canisters), and (3) processing time at the repository's waste-handling facility.

The notice stated that DOE proposed using this method because it seemed most consistent with NWPA's intent that both commercial and defense waste generators pay their full shares of actual costs for the disposal system. The notice further stated that this option would provide an additional incentive for overall nuclear waste disposal efficiency since DOE would consider the likely impacts of defense waste preparation and handling on nuclear waste program costs and, therefore, on the costs of disposing of defense waste.

DOE used four examples in its August 1987 final notice to illustrate its allocation of program costs using the selected full cost recovery method. In one of the examples, DOE estimated that the cost for defense waste disposal will be $5.7 billion (in 1986 dollars), or over 19 percent of the

total estimated $29.5 billion (in 1986 dollars) cost of the nuclear waste program. For this estimate, DOE assumed that (1) two repositories will be built: one in a tuff formation—such as the Yucca Mountain site—and one at an unspecified location in a salt formation, (2) the quantity of commercial spent fuel will be 79,500 metric tons of uranium through the year 2020, (3) the quantity of defense waste will be 16,000 canisters, and (4) the waste system will have an MRS facility.

According to DOE, cost estimates for defense waste disposal will change because of the December 1987 amendments to the act; however, the methodology will remain the same and is adaptable to whatever total system cost is used. The Office of Civilian Radioactive Waste Management (OCRWM), the office established by NWPA to carry out the provisions of the act, is currently preparing revised cost estimates for disposal of defense waste.

## DOE Is Developing an Intra-Agency Agreement

DOE's method for allocating waste program costs will be contained in an intra-agency agreement between OCRWM and DOE's Assistant Secretary for Defense Programs, the component which manages defense waste. The agreement is intended to formalize the terms and conditions governing OCRWM's provision of nuclear waste disposal services to Defense Programs, to specify the method used to calculate disposal fees for defense waste, and to specify plans for making payments into the Nuclear Waste Fund.

According to Defense Programs officials, the intra-agency agreement will resemble the final standard contract, Standard Contract for Disposal of Spent Nuclear Fuel and/or High-Level Radioactive Waste, that DOE developed for the utilities and published in the Federal Register on April 18, 1983. OCRWM expects to publish, without obtaining public comments, its memorandum of agreement in the Federal Register.

## Objectives, Scope, and Methodology

By letter dated March 24, 1987, the Chairman, Subcommittee on Energy and Power, House Committee on Energy and Commerce, requested that we describe DOE's efforts to establish the federal government's defense waste disposal fee in the nuclear waste program. On the basis of that letter and subsequent discussions with the Subcommittee's staff, we agreed to review DOE's plans to allocate nuclear waste program costs to the government's defense waste program.

Our review was limited to assessing DOE's approach to allocating nuclear waste program costs to defense waste generators. We did not review specific cost elements of the methodology to determine if these costs were appropriately allocated.

In reviewing this issue, we reviewed applicable provisions of NWPA and its legislative history, implementing federal regulations, documents relating to DOE's cost allocation method and intra-agency agreement, and other pertinent documents. We obtained pertinent financial data from DOE's financial information system.

In the absence of specific cost allocation criteria in the NWPA and its legislative history, we turned to GAO's Accounting Principles and Standards for Federal Agencies (Title 2 of GAO's Policy and Procedures Manual for Guidance of Federal Agencies). The Federal Manager's Financial Integrity Act (31 U.S.C. 3512) requires heads of agencies to establish and maintain accounting systems that conform with GAO's principles and standards. Among other things, GAO's Title 2 directs executive agencies to refer to the Cost Accounting Standards issued by the former Cost Accounting Standards Board for guidance on specialized cost accounting issues.

The Board's "Cost Accounting Standards Guide" states that the ability to allocate costs results from a relationship between a cost and a cost objective—a function, organizational subdivision, contract, or other work unit—such that the cost objective appropriately bears all or a portion of the cost. For a particular cost objective (such as DOE's defense program) to have allocated to it all or part of a cost there should exist a beneficial or causal relationship between the cost objective and the cost.

Therefore, we used the concept of beneficial or causal relationship as the primary criterion to evaluate DOE's approach to allocating costs through direct assignment and allocation of indirect costs. As applied to the nuclear waste program, this concept states that program costs shall be attributed to those entities—either utilities or DOE—that either caused the costs to be incurred or benefitted from their incurrence.

We discussed DOE's cost allocation method and proposed intra-agency agreement with DOE officials in Washington, D.C., and contractor personnel. We also interviewed representatives of the National Association of Regulatory Utility Commissioners in Lansing, Michigan. The National Association of Regulatory Utility Commissioners is a quasi-governmental, nonprofit organization engaged in the regulation of utilities and

motor carriers encompassing the 50 states, the District of Columbia, Puerto Rico, and the Virgin Islands. Among its other duties, the Association is the national representative of state commissions responsible for the economic regulation of utilities, including utilities operating nuclear power plants. As such, these commissions are charged under state laws with ensuring that the electrical power provided by such plants is reliable and reasonably priced and, in short, that the public interest is protected.

In addition, we interviewed representatives of the Edison Electric Institute and the Utility Nuclear Waste Management Group in Washington, D.C. The Edison Electric Institute is a national association of investor-owned electric companies. Its membership includes the majority of DOE's nuclear waste services customers. The Utility Nuclear Waste Management Group is funded by 46 utilities with nuclear programs, including Edison Electric Institute member companies, public utilities, and cooperatively owned utilities. Its sole purpose is to oversee DOE's implementation of NWPA and to assist in the resolution of spent fuel storage and nuclear waste disposal issues.

The Chairman's March 24, 1987, letter also asked us to review DOE's plans for making defense waste disposal payments into the Nuclear Waste Fund. We have been unable to complete our analysis pending DOE's issuance of three key documents which are important for a thorough evaluation of the payment issue. Specifically, DOE does not expect to issue its annual nuclear waste program cost and fee adequacy reports—originally scheduled for release in August 1988—until January 1989. In addition, in December 1988, DOE completed and submitted to the President a document addressing its long-term strategy for cleaning up and modernizing its atomic energy defense facilities; however, this doucment has not yet been publicly released. As agreed with the Subcommittee's staff, we will complete our review once these documents are available and will provide the results of our analysis of DOE's defense waste payment plans in a separate report.

We performed our work during the period June 1987 through October 1988 at DOE headquarters in Washington, D.C. Our review was made in accordance with generally accepted government auditing standards.

Chapter 2

# DOE's Method for Allocating Program Costs for Defense Waste Complies With NWPA

DOE's method for allocating waste program costs to the federal government for defense waste disposal complies with NWPA requirements. It is consistent with cost accounting concepts developed by the former Cost Accounting Standards Board and, therefore, is an acceptable method for ensuring that the government is charged the full cost of defense waste disposal through fees equivalent to commercial waste disposal fees. Utilities, state regulatory commissions, and their associations, however, disagree with DOE's allocation of certain costs.

## DOE's Waste Program Cost Categories

DOE annually develops estimates of the total cost of disposing of waste generated through December 31, 2020. These estimates are known as the total system life-cycle cost, or TSLCC, estimates. DOE's total waste program cost estimates prepared through April 1986 were comprised of three major cost categories—development and evaluation, transportation, and repository construction and operation. In its June 1987 cost estimate report, DOE added another category reflecting the estimated cost of adding an MRS facility to the waste system.

The development and evaluation category includes costs for siting, design development, testing, and regulatory and institutional activities associated with the repositories, the MRS facility, and the transportation system. Also included in this category is the cost of administering the waste management program by the federal government. Most of the development and evaluation activities take place before the construction of waste management facilities and the fabrication of waste packages and transportation casks. Some activities, however, such as regulatory activities, will continue through repository construction and operation. The development and evaluation category encompasses all program expenditures both currently and for the next several years.

The transportation category includes costs for the purchase of shipping casks and for carrying out the actual transportation of waste once the system is operational.

The repository construction and operation category includes costs for engineering, construction, operation, and closure and decommissioning of both surface and underground facilities. Within this category are costs for surface support facilities for security, fire protection, food service, administration, maintenance, and laboratories; waste-handling buildings; and underground shafts and ramps. Also included are costs for staffing, supplies, and utilities over the waste preparation and emplacement phase, the caretaker phase, and any subsequent period

through the decommissioning phase. The latter phase involves permanently sealing the boreholes, decontaminating surface facilities, and returning the site to its natural state.

The MRS category includes costs for the design, construction, operation, and decommissioning of one MRS facility.

## DOE's Cost Allocation Method

DOE has stated that its method for allocating costs between commercial and defense waste generators is based on the concept of full cost recovery.[1] (See app. I for an illustration of DOE's full cost recovery method.) Under this method, DOE groups costs into the four major cost categories of development and evaluation, repository construction and operation, transportation, and MRS. Costs within these categories are classified as either direct, common variable, or common unassigned costs. According to the Chief of OCRWM's Financial Analysis and Audit Branch, classification of the costs within each category is based on the engineering expertise of the OCRWM and Defense Programs staffs. (See app. II for a classification of costs in each category as either direct, common variable, or common unassigned costs.)

Direct costs are incurred solely for the disposal of either commercial or defense wastes. An example of direct costs is transportation costs. Common variable costs are incurred for the disposal of both types of wastes and can be allocated to each on the basis of some relevant physical parameter, such as the repository area or number of waste canisters. Most of the repository costs have been identified as common variable costs. Grouped together, direct and common variable costs are classified as assignable costs.

Common unassigned costs are incurred for the disposal of commercial and defense wastes but, as contrasted with common variable costs, cannot be directly allocated on the basis of some relevant physical parameter like the number of waste canisters. DOE classifies most of the development and evaluation costs, such as the cost of site characterization, as common unassigned costs.

[1]The fee paid by commercial utilities is based on the concept of full cost recovery, i.e., DOE is required by NWPA to set the fee at a rate that will ensure that all costs associated with the repository are paid by those who directly benefit from the repository.

Once all costs are classified as direct, common variable, or common unassigned costs, they are directly assigned or allocated to either commercial or defense waste generators on the basis of presence of a causal or beneficial relationship. For example, commercial waste transportation costs are directly assigned to commercial waste generators, and defense waste transportation costs are assigned to DOE. All MRS costs are assigned to commercial waste generators because the facility will be used to prepare commercial spent nuclear fuel for emplacement in a repository but will not be used for handling or storing defense wastes.

Costs classified as common variable costs are allocated to both commercial and defense waste generators on the basis of the (1) piece count, (2) waste-handling building No. 1 piece count, (3) waste-handling building No. 2 piece count, or (4) areal dispersion factors.[2] The piece count factor is the ratio of the number of commercial or defense waste disposal packages in the repository to the total number of disposal packages in the repository. The piece count for each waste-handling building is the ratio of commercial or defense waste packages to the total number of packages processed in each respective waste-handling building. The areal dispersion factor is the ratio of the repository disposal area required for commercial or defense waste to the total disposal area. DOE allocates most of the costs in the repository category using the four cost-sharing factors described above. Appendix III provides a complete listing of the cost-sharing factors used to allocate common variable costs.

Common unassigned costs are allocated to both commercial and defense waste generators in proportion to their respective shares of the appropriate assignable (direct and common variable) cost categories. For example, as shown in table 2.1, common unassigned first repository costs are allocated to commercial and defense waste generators based on the percentage of total assignable first repository costs assigned to each waste generator. This table illustrates how DOE allocated common unassigned first repository costs for one cost estimate.

[2]A geologic repository will consist of both surface and underground facilities. The principal surface facility will be the waste- handling building(s), which will be designed to receive, prepare, and transfer wastes underground.

**Table 2.1: Allocation of Common Unassigned First Repository Costs** (in 1986 Dollars)

Dollars in millions

| | Commercial | Defense | Total |
|---|---|---|---|
| Assignable first repository costs | $2,952 | $895 | $3,847 |
| Percent of total assignable first repository costs | 76.72 | 23.28 | |
| Common unassigned first repository costs | $1,246 ($1,624 x 76.72 percent) | $378 ($1,624 x 23.28 percent) | $1,624 |

## Cost Allocation Method Complies With NWPA Requirements

In commingling commercial and defense waste, NWPA requires DOE to allocate the costs of developing, constructing, and operating the repository between these two categories of waste generators. Further, the act requires that when federally owned or generated waste is deposited in the repository, the federal government pay into the Nuclear Waste Fund amounts "equivalent to" the fees paid by commercial utilities. (Neither NWPA nor its legislative history define the term "equivalent.") These two provisions, read together, appear to exhort DOE to ensure that neither category of waste generator subsidizes, in effect, the costs of disposing of waste generated by the other.

As discussed in chapter 1, we consulted our accounting principles and standards prescribed for agencies for more specific criteria for evaluating DOE's cost allocation method. This led us to the position of the former Cost Accounting Standards Board that the concept of causal or beneficial relationships should be used as a basis for allocating costs to cost objectives.

We found that DOE's cost allocation method for defense waste is consistent with the Board's position that a causal or beneficial relationship should be used to appropriately allocate costs to cost objectives. Specifically, DOE's assignable costs are to be directly assigned, or be allocated on the basis of cost-sharing factors (such as repository area), to either commercial utilities or DOE for disposal of their respective quantities of commercial or defense wastes.

The concept of causal or beneficial relationship also extends to the allocation of the common unassigned costs. Specifically, the Board stated that where costs are not directly identified with cost objectives, they should be grouped into logical "pools" for allocation to cost objectives in accordance with a hierarchy of preferable techniques. With respect to pooled costs that cannot readily be allocated on measures of specific

beneficial or causal relationship, the base selected to measure the allocation of these costs to cost objectives should be representative of the entire activity being managed. The Board stated, for example, that the total cost of plant activities managed might be a reasonable base for allocation of general plant indirect costs. DOE's approach of allocating common unassigned costs in proportion to their respective shares of the appropriate assignable costs is consistent with this guidance. For example, as illustrated in appendix I (table I.1), DOE allocated common unassigned costs associated with developing the first repository on the basis of the percentage of total assignable costs of the repository allocated to commercial utilities and DOE.

We, therefore, believe DOE's method complies with the NWPA requirements of full cost recovery and equivalency. The method is directed at ensuring that the federal government will bear the defense waste share of repository costs and that neither commercial generators nor DOE will subsidize the other over the life of the waste program.

## Disagreement With DOE's Allocation of Common Unassigned Costs

Utilities, state regulatory commissions, and their associations basically agree with DOE's approach for allocating the direct and common variable costs. They disagree, however, with DOE's allocation of the common unassigned costs. The Edison Electric Institute, for example, has stated that the common unassigned costs are essentially the same amount for each repository included within the program, and that these costs are, therefore, reduced by one-third by commingling defense and commercial waste in two waste repositories as opposed to three—two commercial and one defense—repositories. Therefore, the Institute suggests that the common unassigned costs which remain should be allocated to the commercial and defense sectors on a two-thirds and one-third basis, respectively.

The National Association of Regulatory Utility Commissioners also advocates allocating the common unassigned costs on a two-thirds/one-third split for commercial and defense waste, respectively. According to the Association's staff, more information is not necessary to allocate these costs on a two-thirds/one-third split because the current costs of the commercial repository are already known. He further explained that allocating the common unassigned costs on a two-thirds/one-third split is consistent with a cost savings approach often used in utility regulation analysis. One utility will buy electricity from another, and the costs to the utility buying the electricity are based on the costs the utility would have incurred had it produced its own electricity.

The two-thirds/one-third percentage allocation proposed by these groups is based on the assumption that two commercial repositories will be developed. However, the development of a second repository is now more uncertain because of the 1987 amendments to the NWPA. The amendments did not change the language in the original act limiting the capacity of the first repository to 70,000 metric tons of waste until a second repository begins operations. The amendments, however, prohibit DOE from conducting site-specific activities on a second repository unless the Congress specifically authorizes and appropriates funds for such activities. The amendments also require DOE to report to the President and the Congress between 2007 and 2010 on the need for a second repository.

If one applies the industry's cost allocation approach to the assumption that only one commercial repository will be developed, common unassigned costs would be allocated equally between commercial and defense wastes even though the amount of commercial waste is expected to greatly exceed the amount of defense waste.

According to DOE, the allocation of the common unassigned costs on the basis of a two-thirds/one-third split has the advantages of being relatively simple in concept and of avoiding the need to assign and share costs for each cost element in a combined repository program. It is, however, based on cost estimates for separate repository systems for commercial waste and defense waste that will remain hypothetical because such systems will not be constructed. DOE states that assigning such costs on the basis of the number of avoided repositories would ignore information that more accurately reflects the relative levels of activity supported by the facilities and activities that are paid for with common fixed costs.

DOE also stated that some of the development and evaluation activities apply to a commercial repository but not to a defense-only repository. For example, prior to passage of the 1987 amendments, NWPA required DOE to nominate and recommend sites determined as suitable for site characterization in selecting a site for the first commercial repository. By commingling the waste, DOE is paying for development and evaluation costs that it would not have to incur had a separate repository been built for defense waste.

In contrast to DOE's method for allocating the common unassigned costs, the Edison Electric Institute's and the National Association of Regulatory Utility Commissioners' approach does not consider the direct and

common variable costs information available but relies on estimated costs. Their approach for allocating the common unassigned costs is not based on an analysis of the behavior of cost actually incurred. Instead, it is based on an estimated cost structure for a hypothetical cost program. Had the President decided to build a separate repository for defense waste, commercial generators would pay 100 percent of the development and evaluation costs (common unassigned costs) for a commercial repository and DOE would pay 100 percent of the development and evaluation costs for a defense repository. This line of reasoning could lead to the two-to-one split suggested by the Edison Electric Institute and the National Association of Regulatory Utility Commissioners. On the other hand, by allocating these costs on the basis of a causal or beneficial relationship, DOE estimates that, under one scenario, commercial and defense waste generators will pay about 78 percent and 22 percent, respectively, of the common unassigned costs.

## Litigation

On October 8, 1987, 31 utilities petitioned the U.S. Court of Appeals for the District of Columbia Circuit for review, among other things, of the cost allocation method adopted by DOE. In November 1987, the court consolidated the utilities' suit and the National Association of Regulatory Utility Commissioners' suit and also granted a motion by the Association to intervene in the utilities' suit.[3]

Petitioners argued that the cost allocation method understated the fees that DOE should pay for disposal of defense waste particularly with regard to common unassigned costs, and that DOE had violated NWPA by failing to address other issues that would affect the civilian waste fee obligation, such as the timing of DOE payments to the Nuclear Waste Fund. Petitioners asked the court to set aside the method and to order DOE to implement what they asserted would be a more equitable and accurate method, and to order DOE to address such other issues as the timing of DOE payments to the fund and interest on late payments.

The court heard arguments from the petitioners and DOE on May 13, 1988. In a June 28, 1988, opinion, the court stated that questions on DOE's cost allocation method can be better considered after DOE has applied the method in the context of assessing the adequacy of commercial waste fees. The court also stated that because the memorandum of

[3]The National Association of Regulatory Utility Commissioners filed suit against DOE in the same court on September 9, 1987. The Association asked the court to review the procedure DOE used in selecting the cost allocation method.

agreement is currently under negotiation and its contents are not yet known, any decisions on the agreement would be premature.

## Conclusions

DOE's method for allocating total waste system costs to commercial and defense waste generators complies with NWPA requirements for full cost recovery and equivalency. Specifically, it is consistent with the cost accounting concept of causal or beneficial relationship to cost objectives. That is, the assignable costs are directly assigned or allocated on the basis of cost-sharing factors to the parties that cause the incurrence of those costs and benefit from the disposal of their commercial or defense wastes. Further, in the absence of specific cost accounting standards which directly apply to the allocation of the common unassigned costs, DOE has used a rational basis for allocating these costs. Common unassigned costs have been allocated on the basis of the causal or beneficial relationship to cost objectives that have been established with regard to the assignable costs.

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Appendix I

# Illustration of DOE's Full-Cost Recovery Method

DOE used four examples in its August 1987 final notice to illustrate its selected method for allocating program costs. Table I.1 illustrates one of the examples DOE used to allocate total program costs using its full-cost recovery method. In this example, the estimated cost for defense waste disposal was $5.7 billion (in 1986 dollars), or about 19 percent of the total estimated $29.5 billion (in 1986 dollars) cost of the nuclear waste program. For this estimate, DOE assumed that (1) two repositories will be built—one in a tuff formation, such as the Yucca Mountain site, and one at an unspecified location in a salt formation, (2) the quantity of commercial spent fuel will be 79,500 metric tons of uranium through the year 2020, (3) the quantity of defense waste will be 16,000 canisters, and (4) the waste system will have an MRS facility.

**Table I.1: Allocation of Program Costs Using DOE's Full-Cost Recovery Method** (in 1986 Dollars)

Dollars in millions

| | Cost allocation | | |
|---|---|---|---|
| | Commercial | Defense | Total[a] |
| **Assignable costs:** | | | |
| Development and evaluation: | | | |
| MRS | $125[b] | | $125 |
| Waste package 1 | 396[b] | | 396 |
| Waste package 2 | 234[b] | | 234 |
| Repository: | | | |
| Repository 1 | 2,952[c] | $895[e] | 3,847 |
| Repository 2 | 2,731[d] | 834[f] | 3,565 |
| MRS | 2,651[b] | | 2,651 |
| Transportation | 1,508[b] | 302[b] | 1,810 |
| **Subtotal assignable costs** | **10,596** | **2,032** | **12,627** |
| **Unassigned costs:** | | | |
| Development and evaluation: | | | |
| Transportation and systems integration | 900 | 180 | 1,080 |
| Other repository | 7,952 | 2,421 | 10,373 |
| Government administration | 1,970 | 378 | 2,347 |
| Repository: | | | |
| Repository 1 | 1,246 | 378 | 1,624 |
| Repository 2 | 1,136 | 347 | 1,483 |
| MRS | | | (12)[g] |
| **Subtotal unassigned costs** | **13,203** | **3,704** | **16,895** |
| **Total assignable and unassigned costs** | **$23,799** | **$5,735** | **$29,522** |

[a]Figures may not total because of rounding.

[b]Costs have been classified as direct costs.

[c]Figure includes $499 million in direct costs.

[d]Figure includes $525 million in direct costs.

[e]Figure includes $200 million in direct costs.

[f]Figure includes $160 million in direct costs.

[g]DOE did not explain this negative balance or why it did not subtract the amount from the subtotal of unassigned costs.

As shown in table I.1, costs have been classified as assignable or unassigned. The assignable costs are either direct or common variable costs. Direct costs have been identified in table I.1. The common variable costs have been determined using the piece count or areal dispersion factors. For example, table I.2 shows the different factors used to determine the defense share of the common variable first repository costs in table I.1.

**Table I.2: Factors Used to Determine the Defense Share of the Common Variable First Repository Costs** (in 1986 Dollars)

Dollars in millions

| | Total first repository costs | Factor | Defense costs |
|---|---|---|---|
| **Common variable costs:** | | | |
| Piece Count | | | |
| Total piece count | $658 | 0.258 | $170 |
| Warehouse building No. 2 piece count | 706 | 0.258 | 182 |
| Areal dispersion | 1,785 | 0.192 | 343 |
| **Direct costs:** | 699 | | 200 |
| **Total** | **$3,847[a]** | | **$895** |

[a]Number may not add because of rounding

The common unassigned costs have been allocated to commercial and defense waste generators in proportion to their respective shares of the appropriate assignable cost categories. For example, the $1,624 million in common unassigned first repository costs shown in table I.1 were allocated to commercial and defense waste generators based on the percentage of first repository costs assigned to commercial ($2,952 million) and defense ($895 million) waste generators to total assignable first repository costs ($3,847 million).

# Classification of Costs in the TSLCC Categories

| TSLCC category | TSLCC account | Type of cost |
|---|---|---|
| **Development and evaluation** | Development and evaluation for MRS | Direct |
| | Civilian waste package development and evaluation | Direct |
| | Transportation and system integration development and evaluation | Common unassigned |
| | Other repository development and evaluation | Common unassigned |
| | Government administration | Common unassigned |
| **Repository** | **Management and integration:** | |
| | Support contractor | Common unassigned |
| | Architect engineer | Common unassigned |
| | Construction management | Common unassigned |
| | Consultants | Common unassigned |
| | Performance confirmation program | Common unassigned |
| | Repository land acquisition | Common unassigned |
| | **Site preparation:** | |
| | Employee transportation | Common unassigned |
| | On-site | Common unassigned |
| | Off-site | Common unassigned |
| | Monuments | Common unassigned |
| | **Surface facilities—waste-handling facility:** | |
| | Waste-handling building 1 | Common variable |
| | Waste-handling building 2 | Common variable |
| | Other | Common variable |
| | **Surface facilities—balance of plant:** | |
| | Change room facility | Common variable |
| | Explosive storage facility | Common variable |
| | Compressed air and steam facility | Common variable |
| | | Cooling tower and chilled water facility Excavated material storage and handling facility |
| | Backfill facility | Common variable |
| | Packing facility | Common variable |
| | Health/medical facilities | Common unassigned |
| | Fire protection facilities | Common unassigned |
| | Security facilities | Common unassigned |
| | Maintenance facilities | Common unassigned |
| | Administration/personnel facilities | Common unassigned |
| | Training/mockup facility | Common unassigned |
| | Warehouse and receiving | Common unassigned |
| | Visitors center facility | Common unassigned |
| | Backup power generation facility | Common unassigned |

(continued)

| TSLCC category | TSLCC account | Type of cost |
|---|---|---|
| **Repository** | Fuel storage facility | Common unassigned |
| | Chemical storage facility | Common unassigned |
| | Lab and testing facilities | Common unassigned |
| | Portable water facility | Common unassigned |
| | Sewage treatment facility | Common unassigned |
| | Control and monitoring facility | Common unassigned |
| | Standard equipment | Common unassigned |
| | Other | Common unassigned |
| | **Surface facilities—surface shaft facilities:** | |
| | Men and materials facility | Common variable |
| | Waste facility | Common variable |
| | Excavated material-handling facility | Common variable |
| | Development intake facility | Common variable |
| | Confinement intake facilities | Common variable |
| | Development exhaust facility | Common variable |
| | Confinement exhaust facilities | Common variable |
| | Exploratory shaft facility 1 | Common variable |
| | Exploratory shaft facility 2 | Common variable |
| | Other facility | Common variable |
| | **Shafts/ramps—underground:** | |
| | Men and materials access (shaft) | Common variable |
| | Waste-handling access (shaft or ramp) | Common variable |
| | Excavated material-handling access (shaft or ramp) | Common variable |
| | Development intake access shafts | Common variable |
| | Confinement intake access (shafts) | Common variable |
| | Development exhaust access (shafts) | Common variable |
| | Confinement exhaust access (shafts) | Common variable |
| | Exploratory shaft 1 | Common variable |
| | Exploratory shaft 2 | Common variable |
| | Other | Common variable |
| | **Subsurface excavations—development:** | |
| | Spent fuel facility excavation | Direct |
| | Defense high-level waste facility excavation | Direct |
| | Common facility excavation | Common variable |
| | Other waste facility excavation | Direct |
| | Excavated material handling | Common variable |
| | General maintenance | Common variable |
| | **Subsurface excavations—emplacement and retrieval operations:** | |
| | | Spent fuel transport and emplacement Defense high-level waste transport, and emplacement |

(continued)

| TSLCC category | TSLCC account | Type of cost |
|---|---|---|
| **Repository** | Other waste transport and emplacement | Direct |
| | Waste removal | Common variable |
| | **Subsurface excavation—backfill:** | |
| | Men and materials access (shaft) | Common variable |
| | Waste-handling access (shaft or ramp) | Common variable |
| | Excavated material-handling access (shaft or ramp) | Common variable |
| | Development intake access shafts | Common variable |
| | Confinement intake access (shafts) | Common variable |
| | Development exhaust access (shafts) | Common variable |
| | Confinement exhaust access (shafts) | Common variable |
| | Exploratory shaft 1 | Common variable |
| | Exploratory shaft 2 | Common variable |
| | Other | Common variable |
| | **Underground service systems:** | |
| | Support system facilities | Common variable |
| | Utilities | Common variable |
| | Monitoring | Common variable |
| | **Waste package fabrication:** | |
| | Spent fuel | Direct |
| | Spent fuel hardware | Direct |
| | West Valley high-level waste and civilian high-level waste | Direct |
| | Defense high-level waste | Direct |
| | Other waste | Common variable |
| **Transportation** | | |
| | Transportation for civilian waste | Direct |
| | Transportation for defense high-level waste | Direct |
| **MRS** | | Direct |

# Cost-Sharing Factors Used to Allocate Costs Classified as Common Variable Costs

| TSLCC account | Cost-sharing factor |
|---|---|
| **Surface facilities—waste-handling facility:** | |
| Waste-handling building 1 | Waste-handling building 1 piece count |
| Waste-handling building 2 | Waste-handling building 2 piece count |
| Other | Piece count |
| **Surface facilities—balance of plant:** | |
| Change room facility | Areal dispersion |
| Explosive storage facility | Areal dispersion |
| Compressed air and steam facility | Areal dispersion |
| Cooling tower and chilled water facility | Areal dispersion |
| Excavated material storage and handling facility | Areal dispersion |
| Backfill facility | Areal dispersion |
| Packing facility | Piece count |
| **Surface facilities—surface shaft facilities:** | |
| Men and materials facility | Areal dispersion |
| Waste facility | Piece count |
| Excavated material-handling facility | Areal dispersion |
| Development intake facility | Areal dispersion |
| Confinement intake facilities | Areal dispersion |
| Development exhaust facility | Areal dispersion |
| Confinement exhaust facilities | Areal dispersion |
| Exploratory shaft facility 1 | Areal dispersion |
| Exploratory shaft facility 2 | Areal dispersion |
| Other facility | Areal dispersion |
| **Shafts/ramps—underground:** | |
| Men and materials access (shaft) | Areal dispersion |
| Waste-handling access (shaft or ramp) | Piece count |
| Excavated material-handling access (shaft or ramp) | Areal dispersion |
| Development intake access shafts | Areal dispersion |
| Confinement intake access (shafts) | Areal dispersion |
| Development exhaust access (shafts) | Areal dispersion |
| Confinement exhaust access (shafts) | Areal dispersion |
| Exploratory shaft 1 | Areal dispersion |
| Exploratory shaft 2 | Areal dispersion |
| Other | Areal dispersion |
| **Subsurface excavations—development:** | |
| Common facility excavation | Piece count |
| Excavated material handling | Piece count |
| General maintenance | Piece count |
| **Subsurface excavation—emplacement/ retrieval operations, waste removal** | Piece count |

(continued)

| TSLCC account | Cost-sharing factor |
|---|---|
| **Subsurface excavation—backfill:** | |
| Men and materials access (shaft) | Areal dispersion |
| Waste-handling access (shaft or ramp) | Piece count |
| Excavated material-handling access (shaft or ramp) | Areal dispersion |
| Development intake access shafts | Areal dispersion |
| Confinement intake access (shafts) | Areal dispersion |
| Development exhaust access (shafts) | Areal dispersion |
| Confinement exhaust access (shafts) | Areal dispersion |
| Exploratory shaft 1 | Areal dispersion |
| Exploratory shaft 2 | Areal dispersion |
| Other | Areal dispersion |
| **Underground service systems:** | |
| Support system facilities | Areal dispersion |
| Utilities | Areal dispersion |
| Monitoring | Areal dispersion |
| **Waste package fabrication—other waste** | Piece count |

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